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FORAGE CROPS FOR HOGS IN
KANSAS AND OKLAHOMA.

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U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,

Washington, D. C., May 20, 1908.

SIR: In December, 1907, there was issued as Part IV of Bulletin 111 in the series of this Bureau the accompanying paper on Forage Crops for Hogs in Kansas and Oklahoma. The practical character of this paper and the large demand for copies lead me to recommend that it be reissued as a Farmers' Bulletin; and, with this end in view, it has been revised.

Respectfully,

Hon. JAMES WILSON,
Secretary.

B. T. GALLOWAY,
Chief of Bureau.

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FORAGE CROPS FOR HOGS IN KANSAS AND OKLAHOMA.

INTRODUCTION.

Farmers are more and more realizing that pasture is necessary for the most economical production of pork. Those who are raising hogs and putting them on the market with the least cost have their entire farms fenced "hog-tight." This enables them to give the hogs the range of the meadows and fields when the crops have been harvested. Much that would otherwise be lost is thus saved by the hogs, for they are among the best gleaners of waste grain, weed seeds, and insects in the fields.

More hog pastures are fenced each year, more experimenting is done, and there is more inquiry as to the best crops for pasture. These questions can not be answered intelligently without a knowledge of the conditions of soil and climate, the market, and the adaptability of crops to different sections of the country.

The Office of Farm Management Investigations has undertaken to ascertain by a study of farm practice: (1) What crops have been found best for pasture for hogs in different localities; (2) the season during which these crops are available; (3) the number of stock they will pasture to the acre; (4) the value of this pasture in connection with other feeds; (5) the quantity of grain necessary to produce a given amount of pork on different pastures; and (6) the cost of producing pork.

While only a small beginning has been made, the demand for such knowledge and its importance to the swine industry of the country has prompted the publishing of this information for each locality as it is obtained.

Although the investigation has not as yet extended beyond a single region, embracing portions of Kansas and Oklahoma, it is believed that the information secured and the suggestions made will be of considerable value to hog raisers in other regions, especially in those areas which have similar soil and climatic conditions.

CROPS USED IN KANSAS AND OKLAHOMA.

During the past summer (1907) about 150 of the most successful swine growers and pork producers of Kansas and Oklahoma were interviewed on the subject of the crops used for feed. In southern Oklahoma along the river valleys and in northern Oklahoma and southern Kansas the farmers are favored with a soil and climate that make it possible to produce pork very cheaply. The mildness of the climate makes it unnecessary to build as expensive shelters for hogs in winter as are required farther north, and the short open winters make it possible to furnish pasture during a greater portion of the year, thus lessening the amount of grain which it is necessary to feed. The main pasture crops for hogs in this region are alfalfa, wheat, oats, and rye, ranking in importance in the order named.

ALFALFA.

It is the testimony of 95 per cent of the farmers interviewed in this region that there is no better forage crop for hogs than alfalfa, where it can be grown successfully.

Alfalfa Pastures.

Amount of pasturage.—As to the amount of pasturage or the number of hogs alfalfa will carry per acre without injury to the crop, the estimates given by farmers vary considerably, depending on the kind of soil, the fertility of the land, and the size of the hogs pastured. The following, however, is a safe average estimate as given by conservative men who have had much experience. River valley and creek bottom land well set in alfalfa will carry from 15 to 20 head per acre of 50 to 125 pound hogs. Upland of fair average fertility will support from 8 to 10 head of the same kind of hogs. There are fields that have supported 25 head per acre all through the season for a number of years and are still in good condition, and there are other fields that will not furnish pasture for more than 5 head per acre; but these are extremes. When a field is used only for pasture it is better to divide it into several lots and move the hogs from one to the other as occasion requires.

Causes of failure.—Those who have failed with it as pasture owe their failure to two causes:

The first is that the alfalfa has been pastured before it has become well rooted. Young alfalfa is too tender a plant to stand severe treatment except under very favorable circumstances. There are a few farmers who have pastured it the same year it was sown and the alfalfa has survived; but this was on rich heavy loam soil, usually creek bottom or river valley land with water not far below the sur-

face, and the season was very favorable. Ordinarily alfalfa should not be pastured until the second year, and better still not until the third year if it is desired to keep the field as permanent pasture.

The second cause of failure with alfalfa is heavy pasturing and lack of judgment in pasturing in unfavorable seasons. A good many farmers have sown a small piece of alfalfa, and then, because it has grown rapidly and all kinds of stock are fond of it, they have turned all the stock on the farm on it and have wondered why their alfalfa was killed out. Others pasture regardless of whether the ground is muddy or whether the season is dry and hot. In either case heavy pasturing is very likely to cause the alfalfa to be killed out.

Length of pasture season.—The length of the season during which this pasture is furnished also varies. Alfalfa is ready for pasture on the average from the middle of April in southern Oklahoma to the middle of May in northern Kansas. It is not best to pasture earlier, as the young alfalfa has not the start it should have for heavy pasturing, nor has it the substance in the plant. When not pastured too early, it will furnish feed at the rate mentioned during nearly the whole season until October in the northern part and November in the southern part of the section referred to. In some years the pasture season will continue a month later in the autumn, owing to the rainfall and the lateness of cool weather. In some seasons, if the summer is unusually dry and hot, the pasture will become short; but usually pasture for the number of hogs mentioned can be depended on for about seven months of the year at the southern limit of the territory named and for about five months at the northern limit. This rule will apply to other sections of the country having the same climatic conditions as Oklahoma and Kansas.

While many farmers pasture alfalfa fields to their full capacity, in some sections, especially in northern Kansas, it is customary to run about half as many hogs as the alfalfa fields will support. This practice permits the cutting of the usual number of crops of hay, though the yield of hay is, of course, reduced.

Food character of alfalfa.—Alfalfa not only furnishes a great amount of pasture, but it is of a character that goes to make bone and muscle. It belongs to the leguminous family of plants, as do the clovers, the cowpea, the field pea, the soy bean, and the vetches, and, while it is furnishing this valuable food, it is adding fertility to the land. Either alfalfa pasture or alfalfa hay, with corn, forms very nearly a balanced ration for animals; and, while it is better to have a grain ration fed with it to hogs as well as other animals, a healthier thriftier hog can be raised on alfalfa alone than on corn alone. Many instances are found where hogs have been raised on alfalfa alone. One Oklahoma farmer marketed in December, 1905,

61 head of spring pigs eight months old that averaged 171 pounds, which had run from the time they were little pigs with their mothers on 15 acres of alfalfa without any grain. They sold on the market for $5\frac{1}{2}$ cents a pound. This made the cash value of the alfalfa pasture about \$38.35 per acre. As will be seen, this is light pasturing, as there were only about 4 pigs per acre besides the brood sows.

Feeding practices and actual results.—As already stated, it is much better economy to furnish a grain ration with the pasture, as it results in better gains and a better product. One man estimates that it takes from one-half to one-third less corn on alfalfa pasture than on a straight grain ration to make a hog ready for market. Many let the hogs run on alfalfa until about six months old, by which time they reach a weight of 75 to 125 pounds, feeding just a little grain; then they feed heavily for about two months and sell the hogs at eight months old weighing 200 to 225 pounds. One farmer, who raises about a thousand hogs a year and who in one year sold \$11,200 worth of hogs, makes a practice of raising his hogs on alfalfa pasture until about eight months old, feeding one ear of corn per head daily. He then feeds heavily on corn for a month or two and sells at an average weight of 200 to 225 pounds. Another man feeds all the corn and slop the pigs will clean up, all the while running them on alfalfa pasture, and sells at six to eight months old at weights of 250 to 300 pounds. Another, who raises about a thousand head a year, feeds all the corn the pigs will eat, beginning shortly after weaning and continuing until the hogs are sold at ten to eleven months old, averaging about 275 pounds.

Still another farmer, from weaning time (two months old) until eight months old, feeds the pigs nothing but dry corn on alfalfa pasture, averaging about one-half gallon of corn ($3\frac{1}{2}$ pounds) a day per head. At the end of eight months he sells at an average weight of 250 pounds. The quantity of corn fed is about $11\frac{1}{4}$ bushels per head. Figuring at the average price of corn in this locality, 35 cents, and the price received for pork, $5\frac{1}{2}$ cents, the following results show the cost of growing pork on this farm and the value of alfalfa pasture:

Value of 250-pound hog, at $5\frac{1}{2}$ cents-----	\$13.75
Value of pig at weaning, 50 pounds, at $5\frac{1}{2}$ cents-----	2.75
Gain from pasture and grain-----	11.00
Cost of $11\frac{1}{4}$ bushels of corn, at 35 cents-----	3.93
Value of pasture per head pastured-----	7.07

Now, compare these results with those of a man who had to depend on other pasture crops than alfalfa. He estimates that it will take 15 bushels of corn on wheat, oats, and rye pasture to raise and fatten a hog so it will weigh 240 pounds at nine months old, besides the pasture and slop. At the price of corn mentioned, 35 cents a bushel,

and with hogs at $5\frac{1}{2}$ cents a pound, note the cost of producing pork on this farm:

Value of 240-pound hog, at $5\frac{1}{2}$ cents-----	\$13.20
Value of pig at weaning, 50 pounds, at $5\frac{1}{2}$ cents-----	2.75
Gain from pasture and grain-----	10.45
Cost of 15 bushels of corn, at 35 cents-----	5.25
Value of pasture per head pastured-----	5.20

The pasture on this farm will not support more than half as many head per acre as alfalfa pasture. Its value is only \$5.20 per head, against \$7.07 per head for alfalfa pasture on the other farm.

The experiences of these men are sufficient to show the value of alfalfa pasture alone, its greater value when grain is fed in connection, and that it is an important factor in economic pork production.

Alfalfa Hay.

While alfalfa pasture has been found to be very valuable for hogs, the hay as a part ration for winter is scarcely less important. Throughout the region referred to the farmers are feeding the hay to hogs in winter. The hay has been found to be especially valuable for brood sows before farrowing. Where it is fed during the winter only a small ration of grain is necessary to keep the sows in good flesh and in healthy condition. Sows thus fed also farrow good litters of strong, healthy pigs.

Feeding methods.—Many feed the hay by throwing it on the ground in forkfuls; others have made low racks in which the hay is placed, where the hogs can feed like cattle or sheep. The hay is usually fed dry. The leaves are more readily eaten by the hogs than the stems, and they contain more of the nutritive value of the plant. For these reasons some farmers save the last cutting of hay for the hogs because it is more relished. It is eaten up cleaner, as the stems are not so woody. Sometimes the hay is cut up fine, wet, and mixed with other feed, and sometimes it is fed ground, as there are now alfalfa mills scattered throughout the alfalfa regions. But it is very doubtful whether this extra expense will pay, unless it be for a ration for young pigs.

Experiences of farmers.—To avoid the expense of cutting or grinding, some farmers in order to get the hay all eaten, have soaked it in water and fed it. This has proved very satisfactory where tried. One Oklahoma farmer carried his hogs through a winter by feeding them alfalfa leaves soaked in hot water for one day and the next day shorts mixed with the pulp and water. He feeds much alfalfa hay to his hogs and is very successful with them. He puts the last cutting in shock as soon as wilted, and thus cures it without bleaching and feeds it to his hogs. Another farmer carried his entire herd of hogs

through the winter by feeding them the pulp of alfalfa hay after soaking it in water over night. He also gave them the water to drink. This was all the feed they had during the winter, and they were in good flesh in the spring, with smooth, glossy coats of hair. A Kansas farmer was feeding a bunch of 50 fall pigs on corn. During the winter they got "off feed" and were not thrifty. He reduced the corn and gave a ration of two-thirds chopped alfalfa hay and one-third corn meal, the two soaked together. The hogs began to do better, and a little later he changed the ration to one-third alfalfa and two-thirds corn. The results were very satisfactory, and the cost of feed was reduced from \$15 a month on corn to \$9 a month on alfalfa and corn. So alfalfa hay, as well as pasture, has a very important use on a hog farm.

WHEAT.

Pasturing winter wheat.—In northern Oklahoma and southern Kansas winter wheat is a staple crop. It is generally sown from the middle of September to the first of October. The amount of seed used is from $1\frac{1}{4}$ to $1\frac{1}{2}$ bushels per acre. If the ground has been well prepared and the fall is not too dry, this will have made a good growth by the time alfalfa pasture begins to fail, along in November. The season here usually remains open until Christmas, so that six weeks of very good pasture are furnished. Some winters are so open that the wheat remains green most of the winter and stock find pasture all winter. The spring opens up by the last of February, and the wheat gets green again in March. By judicious pasturing—not pasturing too heavily or when the ground is muddy—much green feed may be had without injury to the wheat. The farmers here have taken advantage of this, and, where they have their wheat fields fenced hog-tight, turn the hogs from the alfalfa field to the wheat field in November and leave them there during the winter unless the wheat gets too short or the ground becomes muddy. The hogs remain in the wheat until April and do well with very little grain. At this time they can go back to the alfalfa field again. Thus, green pasture is furnished the year round.

Where this is possible two litters a year of 200-pound hogs can be raised with profit, and pork is thus produced very cheaply.

Difficulties.—One farmer of large experience thinks it is dangerous to pasture pigs at about weaning time on wheat. He has lost twice, he thinks, from that cause. The last time he saved only 15 out of 45 head. He claims that wheat is too fibrous and collects in balls in a pig's stomach and intestines, causing inflammation, from which the pig dies. It is claimed by some farmers that wheat is injurious to hogs just as it begins to shoot in spring. More information is needed on this point. The usual practice is to remove the hogs from wheat in

early spring and put them on alfalfa or other summer pasture, so that experience with wheat pasture later in the season is limited.

Value as a forage crop.—Wheat will not carry as many hogs to the acre as alfalfa. The usual number is about 6 head per acre, though some farmers claim that the maximum is about 10. One man claims that hogs are excellent animals for pasturing on wheat, not trampling it out as cattle or horses do.

The value of wheat as pasture lies chiefly in the fact that it furnishes green feed for the hogs at a season of the year when it is very much needed, especially by young and growing hogs. By having pasture at this season there is a great saving of grain, very little being needed. It also enables fall pigs farrowed in September to be carried through the winter in good condition, thrifty and well grown, so that by giving corn in the spring they can be sent to market by June nearly as cheaply as the March pig can be shipped by December. Quite frequently, where hogs have been grown on pasture, they will, when put on a heavy feed of corn, make a gain of 12 to 15 pounds for every bushel fed.

OATS.

In the same region where wheat is used for pasture, oats are also used for spring pasture and are highly spoken of by all who have used them. Some claim that hogs will do better on oats than on wheat. The hogs like them better and will eat them as long as they grow, while they do not like wheat when it begins to head. In this region many sow oats in March to furnish spring pasture for the hogs when they come off the wheat and before the alfalfa is ready to pasture. Sometimes oats are sown with rape at this time for the same purpose and to give variety to the pasture. Oats will furnish pasture at about the same rate as wheat.

The great value of oats is due to the fact that they furnish succulent feed at a season when it is much needed. They are also greatly relished by hogs. Oats are particularly valuable as pasture for sows and young pigs, many farmers sowing them for this purpose. One farmer claims that he is less troubled with scours in pigs on oat pasture than on alfalfa.

RYE.

Rye is not so generally grown for a pasture crop in Oklahoma and Kansas as the crops just discussed. Many farmers, however, use rye to make a part of the pasture crop for their hogs, and its value can not be denied.

Rye is sown from September 1 to the middle of October. The early seeding is best, as it comes on early and gets well established before cold weather, and will thus make better fall and winter pasture. Rye is an excellent pasture for late fall, winter, and early

spring. If not pastured too heavily in the spring it will head out and make a very good yield of grain. The grain is an excellent ration to feed with corn to pigs and growing hogs or to grind and mix in slop for sows with pigs.

The amount of pasture furnished by rye is about three-fourths that furnished by alfalfa, its carrying capacity being estimated at 6 to 12 hogs per acre. One man reports having pastured 50 head of hogs on 5 acres during fall, winter, and spring, then harvesting 20 bushels of grain per acre. In the southern part of this region rye would be an excellent cover crop for the soil during the winter. Besides furnishing pasture, it could be turned under as a green manure to add humus to the soil.

LESS IMPORTANT FORAGE CROPS.

While alfalfa, wheat, oats, and rye are the principal forage crops, there are others that are used to some extent. Among these are clover, rape, sorghum, cowpeas, soy beans, artichokes, and grasses.

Clovers.

The clovers are not generally used in the territory discussed. Among those most used for pasture crops are red clover and white clover. These are good in the latitude of central Kansas and farther north, but south of this the clovers do not do so well. Red clover and white clover are in more general use in the older sections of the country. They are both excellent forage crops for hogs.

Red clover.—Red clover comes in well in the rotation of crops; it fertilizes the land and furnishes both pasture and hay. It is often sown with oats or barley in the spring, or later in corn after the last cultivation. It does very well with corn where there is sufficient rainfall, but in the drier regions this plan is not to be recommended. The first fall it is used for pasture; the second season it is used as a pasture and hay crop. It will furnish pasture for about 10 head of hogs per acre during the first half of the season and half that many the last half, provided the soil is fairly good and the season not too dry. The hay is excellent for hogs, especially for brood sows in winter, but does not equal alfalfa hay.

White clover.—White clover is better used in permanent pasture with some of the grasses, as Kentucky bluegrass. It will not furnish as much pasture as red clover, but is especially good while in bloom during May and June. It does better on moist ground than red clover and will do very well on some poor soils. It is not recommended to sow alone nor for hay, although the dry hay contains more than 14 per cent of crude protein.

Alsike clover.—Alsike clover is better in some regions than red clover, especially on low, moist ground. In some localities farther

north it does better and is a more certain crop. It will supply about as much pasture as red clover, is sown at the same time, and furnishes pasture for the same period. As a hay crop it will not yield as much, but it is a little better than red clover, as it does not have as woody a stem.

Crimson clover.—Crimson clover has not succeeded well in the past in this region, but is to be recommended for further trial as a pasture crop. Along the Atlantic coast, the only region where it is largely and successfully grown, it has been found that the hairs of the blossoms are likely to gather in dense balls in the stomach and intestines of animals, especially the horse, and cause death. For this reason it should not be cut for a hay crop after the flowers mature. It is an excellent winter pasture crop for swine, however, and will furnish more pasture than red clover. It is a winter annual, and should be sown in August or September.

The chief value of crimson clover is that it acts as an excellent cover crop for soil during the winter months and prevents the soil from washing or leaching. It also furnishes in southern regions excellent winter and early spring pasture for hogs.

Rape.

Methods of culture.—Rape is usually sown in early spring—in March or early in April—in Oklahoma and furnishes pasture by May. The Dwarf Essex variety is used. It is sown either broadcast, at about 4 pounds of seed per acre, or else in drills 30 to 32 inches apart, using 3 pounds per acre. Drilling is the best method, as this permits of cultivation. The plants grow more rapidly and make pasture sooner. When sown in drills, the hogs will not break down and destroy so much of the crop.

Value as a forage crop.—Early-sown rape will furnish pasture from May until August. If rape is not grazed too closely in the spring and the stalk is not eaten off, it will grow up and make fall pasture. A good growth of rape will supply pasture for about 15 or 20 hogs to the acre. One man claims that it will take 25 head to pasture it down. Its value as a forage crop is shown in the experiments of the Wisconsin Agricultural Experiment Station, where it was proved to have a feeding value per acre, when combined with a ration of corn and shorts, equivalent to 2,436 pounds of grain and a money value of \$19.49 per acre. The seed can be bought usually for 8 cents a pound, and 3 to 5 pounds an acre is all that is needed. Rape should not be pastured until it is a foot high.

Difficulties.—It is often difficult to get hogs to eat rape at first if they have not been accustomed to it. For this reason it is not grown by some. Considerable complaint is made that rape causes sores and scabs on the hogs. Sometimes the skin has the appearance of

being blistered. This is especially true of white hogs. This difficulty can be remedied somewhat by removing the hogs to other pasture crops for part of the time and applying a mixture of sulphur and lard to the sores.

As one of the annual forage crops rape is valuable on account of the cheapness of the pasture, the quantity of feed furnished, the general thriftiness of the hogs on the pasture, and because it adds variety to the ration and is available at a time when other pastures may be short.

Sorghum.

Sorghum is used quite extensively in the drier upland regions for summer pasture. It is valuable on account of the great amount of feed furnished, pasturing from 20 to 30 head of hogs per acre. It comes in as a summer pasture when other pastures are short on account of hot dry weather. It is sown in May and furnishes pasture during July, August, and September, or even later.

Sorghum is less palatable and nutritious than many other forage crops adapted to this region. For this reason many do not like it as a pasture crop. Hogs do not thrive as well on it as on alfalfa and require more grain to keep them growing nicely.

The special value of sorghum lies in the fact that it furnishes a great abundance of pasture in dry hot weather when alfalfa makes little growth. After it is well started, say 2 feet high, it will furnish fairly good pasture for 30 hogs to the acre for a few weeks, and a good crop will carry 25 head of 100-pound pigs nearly all summer.

Cowpeas.

Cowpeas are just beginning to be recognized in this section as having great feeding and fertilizing value. They do much toward restoring the fertility of the soil, and some farmers are making use of the vines as a forage crop for their hogs. Wherever they have been tried the farmers are enthusiastic in their praise of them. Not enough data have been obtained on pasturing to be able to say how many head of hogs cowpeas will support per acre; but in a comparison of their feeding value for hogs with that of corn the results obtained by the South Carolina Experiment Station show their importance. In this test 6.02 pounds of corn and 4.91 pounds of cowpeas were necessary to produce a pound of pork. One farmer in Oklahoma reported that his hogs preferred the cowpea hay to alfalfa hay. All kinds of stock are fond of the hay and do well on it.

Cowpeas furnish a food on which hogs make good gains. The plants will make a good growth on rather poor soil and furnish feed during late summer and fall when other green crops may be short. They also bring the soil into a more productive state, the same as clover or alfalfa.

If cowpeas are planted in May they will make late summer pasture. The best pasture is obtained after the peas are formed and well grown, as the peas are very nutritious and cause the hogs to gain in flesh rapidly.

Canadian Field Peas.

In this same latitude in the higher altitudes, as in the San Luis Valley in southern Colorado, where it is too cold for corn, the farmers have found the Canadian field pea a very profitable crop for forage both for sheep and hogs. A large acreage of these peas is put in each year, the peas being sometimes sown alone, but more frequently with oats or barley. The seeding is done in April or early in May, and the crop can be pastured by midsummer. The best season for pasturing, however, is later, when the peas have formed, the stock being allowed to harvest the crop. Hogs make a very thorough harvesting, cleaning up the peas and the vines quite thoroughly. What vines are left on the ground, together with the manure, enrich the soil and add more humus to it. In addition to this the labor of harvesting is saved. Some fields, of course, are harvested for hay and make excellent winter forage for cattle, horses, and sheep. The hogs raised in this valley receive no corn. They go on the market as bacon hogs, and top the market in competition with corn-fed hogs. These hogs usually get no farther than Pueblo, Leadville, Silverton, and adjoining towns. The Pueblo packers have been using them for a number of years and speak very highly of them. Thus, the field pea has made the hog industry profitable outside of the corn belt.

Soy Beans.

The soy bean is used but little as a forage crop by farmers in this section, and the value of this crop is but little appreciated. Soy beans can be planted on a field from which a small grain crop has been removed, and some varieties will make an excellent growth of forage and even mature seed. They will thus furnish pasture for hogs during the latter part of August and September, and the green and ripening beans when harvested by the hogs in this way make an excellent feed. The beans when fed in a ration consisting of one part beans and three to five parts of corn or Kafir corn, as shown by the Kansas Agricultural Experiment Station, make a very profitable ration for fattening hogs. The saving in the amount of feed necessary to make a gain of 100 pounds is from 13.2 to 37.5 per cent and the increase in gain is from 14.6 to 96.4 per cent. Also, in a feeding test at the Indiana Agricultural Experiment Station, where soy beans, middlings, and tankage were used as rations with corn, the soy beans proved to be the most valuable adjunct used. As compared to corn fed alone, hogs that received one-third soy beans to two-

thirds corn made two and one-fifth times as much gain in the same length of time. The cost per 100 pounds of gain where corn was fed alone was \$5.01 against \$3.59 where one-third soy beans and two-thirds corn was fed. Hogs so fed look thrifty, have a good appetite, fatten rapidly, and have glossy hair like animals fed oil meal.

The great value of the soy bean is its power to withstand excessive drought, like Kafir corn, and it will also withstand much wet weather. It is not attacked by chinch bugs and in addition to its great feeding value makes an excellent second crop following wheat or oats to build up run-down or thin soil. Protein is very necessary in a ration for building bone and muscle, as all feeders are coming to know, and the soy bean is exceptionally rich in this. It even stands ahead of alfalfa in this respect.

Grasses.

The grasses are not so good for hog pasture as the crops previously mentioned, but they are used to some extent. Those most commonly grown are Kentucky bluegrass, English bluegrass or meadow fescue, Bermuda grass, and the native wild grasses.

Kentucky bluegrass is used through Kansas and southern Nebraska. South of Kansas in Oklahoma Bermuda grass is used.

As an example of the value of English bluegrass, the experience of one farmer in northern Oklahoma may be cited. He uses only English bluegrass and wild grass as pasture. On 12 acres of the bluegrass sown the fall before he pastured 150 head of stock hogs all the spring until about the middle of May. The hogs were then taken off and the grass allowed to go to seed. This farmer states that he harvested a crop of seed larger than the ordinary crop.

Bermuda grass is not much used as a pasture for hogs, but should be grown more in regions to which it is adapted. It is relatively rich in protein, is not easily killed out by pasturing, and withstands drought well. It is often used as a soil binder, and might well be used for hog pasture. Many hilly farms that are now washing badly could be put in Bermuda grass and pastured to stock, thus saving the land and building up the soil. Some farmers are beginning to make use of this grass and are fencing it for hog pasture. It withstands heavy grazing, rooting, and trampling.

Some farmers have fenced in the prairie grass and are now grazing their hogs on it. While it does not have a very high feeding value, hogs will do very well on it with grain. One man claims that prairie grass will make hogs hold their own at the rate of 6 head per acre.

Root Crops.

The root crops most used in this territory are potatoes, artichokes, peanuts, and sugar beets.

Artichokes.—Artichokes are a very good root crop to use for hogs. They can be planted in the spring in the same way as potatoes and cultivated the same. In the fall the hogs can be turned in to harvest them. They thus furnish a good late fall and winter food, especially for brood sows and shoats. One farmer claims that 1 acre will keep from 20 to 30 head in fine condition from October till spring. Their use reduces considerably the amount of corn that must be fed. None of the tubers need be dug except for seed; the hogs will dig the rest. Early in the fall hogs do not eat artichokes readily. In winter and spring they eat them greedily.

Artichokes have a tendency to become a pest on cultivated land; and, if planted continuously on the same land, they become diseased. They may be grown very successfully, however, in a pasture crop rotation for hogs. As the acreage needed is not large, they can be planted on a part of a field in March or April, the rest of the field being sown to rape. In August the part sown to rape can be reseeded to rape for fall pasture. The next spring oats can be sown after the rape, and barley after the artichokes. The crop may be pastured continuously if needed, or later mowed for hay. In August, after this crop is removed, rye and clover may be sown. This will furnish pasture for the ensuing fall and for the following year. This makes a three-year rotation of pasture crops that fit in very well with each other. Preparing the land in July and August for the following crop of rye and clover effectually eradicates the artichokes.

The Oregon Agricultural Experiment Station made a test to determine the feeding value of artichokes with grain for hogs. The result of the test showed that where they were fed there was a saving of nearly 2 pounds of grain for every pound of gain in live weight. Besides, the hogs were healthy and vigorous all the time.

The artichoke is superior to the common beets and turnips for hogs, about equal to potatoes, and richer in protein than sweet potatoes.

Peanuts.—Peanuts are but little used in this region, but farther south and east they are used extensively. One man estimates that when pork is 4 cents a pound, peanuts return \$10 per acre when harvested by hogs.

The Alabama Agricultural Experiment Station made investigations as to the relative value of peanuts, chufas, cowpeas, rape, sorghum, and sweet potatoes as pasture crops for hogs. The amount of grain required with peanuts to make 1 pound of gain was 1.77 pounds; with chufas, 2.3 pounds; with rape, 2.68 pounds; with cowpeas, 3.07 pounds; with sweet potatoes, 3.13 pounds, and with sorghum, 3.7 pounds. Five Tamworth hogs in twenty days on Spanish peanuts gained 2.29 pounds a day each.

Peanuts can be very profitably grown in many sections in the latitude of Oklahoma and Kansas. This crop will do better on a sandy loam than on a heavy clay soil, and will make a fair crop on thin soil where corn will not yield well. They are a very good crop to raise, both for pasture and for hay; stock of all kinds are very fond of the hay. When the nuts are left on, it is richer in protein than alfalfa hay. The best variety to grow, both for hay and pasture for hogs, is the Spanish peanut. It is a small-sized nut and grows in great clusters close around the taproot of the plant. The Spanish nut is not so particular in soil requirements as the larger varieties and is easier harvested on account of growing in clusters.

It is claimed that peanuts can be grown in dry regions where corn will not succeed. This, if true, is important in the southern plains region. Peanuts can be made to take the place of corn in fattening hogs, although the peanut-fed hog makes softer lard and the quality of the meat is not so good, especially in the bacon hog. But as an adjunct to corn the peanut is an excellent forage crop. It is claimed that the northern-grown nut is better flavored and less oily than that grown in the South.

The peanut can be planted the last of April or the first of May in the latitude of the regions discussed in these pages and is ready to turn the hogs on by the last of August.

Sugar beets.—In Colorado, in the sugar-beet district, hogs have been fed quite extensively on beets in the winter. Beets do not prove satisfactory when fed alone, but are used to some extent as part ration with grain. One farmer states that he saves a good supply each year to feed in the winter to his hogs to keep them in a healthy condition.

In a feeding test at the Colorado Agricultural Experiment Station sugar beets proved to be wholly unsatisfactory when fed with grain. The cost per hundred pounds of gain of hogs fed beets and barley was \$6.01; of hogs fed beets and corn \$7.22, the latter being higher than any other ration fed.

Pumpkins.

Pumpkins are an excellent feed for keeping hogs in a healthy condition. Many farmers claim that the seeds of pumpkins will prevent worms in pigs and shoats and that a ration of pumpkins fed with grain will keep hogs thrifty and give them a good appetite. A good many wagonloads can be grown on an acre of rich land. Stumpy land or low moist land will grow good pumpkins.

PASTURE CROPS FOR DIFFERENT SEASONS.

It is not the purpose of this bulletin to discuss the rotation of crops and its importance on the farm, but the aim is to briefly mention the forage crops that are adapted for hogs each month of the year in this region and to explain how they can be made to overlap each other, so that green pasture can be provided for each month in the southern part of the territory discussed and for the greater part of the year in the northern part. Hog raisers know that during some months of the year there is an abundance of pasture, while during others there is very little if any, at which times other feeds must be resorted to that will supply the deficiency. The extra feed required is expensive and cuts down the margin of profit in pork production.

It will not be practicable to name the crop that is best adapted to every locality for the different seasons, as each farmer must know his soil and conditions and adapt his crops to those conditions. The following table will show the crops that may be ready for pasture in the months specified and the possible area of pasture provided, but the choice of one or more crops from the list must be left to the farmer himself.

Crops that may be available for pasturing hogs during the different months of the year, with the number of head an acre will support.^a

For pasture during—	State.	Crops that may be used.	Time of sowing.	Number of hogs that can be pastured per acre.
April and May	Oklahoma	Alfalfa	A previous year.....	8-16
		Rye	Preceding fall.....	6-10
		Oats	March 1.....	6-10
		Rape	do.....	15-20
		Alfalfa	A previous year.....	8-16
	Kansas	Rye	Preceding fall.....	6-10
		Clover	do.....	6-10
		Oats	Last of March.....	6-10
		Kentucky blue-grass	8-10
		English bluegrass	Preceding fall.....	8-12
June and July	Oklahoma	Spring rye	March 1.....	6-10
		Late oats	April 15	6-10
		Sorghum	March 1 to April 1	20-30
		Alfalfa	A previous year.....	8-16
		Potatoes	March	(Unknown.)
	Kansas	Rape	March 1 to April 15	15-20
		Spring rye	April 1 to 15	6-10
		Late oats	April 15 to May 1	6-10
		Sorghum	April 1	20-30
		Alfalfa	A previous year	8-16
August and September	Oklahoma	Prairie grass	April	5
		Sorghum	April	20-30
		Cowpeas	May	10
		Soy beans	do	18
		Peanuts	April	8-10
	Kansas	Alfalfa	A previous year	5-10
		Sorghum	May 1	20-30
		Cowpeas	do	10
		Soy beans	do	10
		Peanuts	do	8-10
		Potatoes	April 1	(Unknown.)
		Alfalfa	A previous year	5-10

^a The number of hogs that can be pastured per acre, it must be remembered, depends on the fertility of the soil, on the season, and on the size of the hogs. This estimate is based on the same figures as were secured on alfalfa pasture; i. e., hogs that weigh from 50 to 125 pounds per head.

Crops that may be available for pasturing hogs, etc.—Continued.

For pasture during—	State.	Crops that may be used.	Time of sowing.	Number of hogs that can be pastured per acre.
October and November	Oklahoma....	Alfalfa	A previous year.....	7-14
		Wheat	September 15.....	6-8
		Rye	September 1.....	7-10
		Sweet potatoes	May 1	8-12
		Artichokes.....	March or April.....	15-25
	Kansas	Rape ^ado.....	15-20
		Alfalfa	A previous year.....	7-14
		Wheat	September 1.....	5-6
		Clover.....	March or April.....	6-10
		Peanuts	May 1	8-10
December and January	Oklahoma....	Rye	September 1.....	5-6
		Sweet potatoes	May 1.....	8-10
		Artichokes	April.....	15-25
		(Wheat	September 15 to October 1.....	5-8
		Rye	September	5-8
	Kansas	Artichokes	April	15-25
		(Wheat	September 1.....	5-8
		Ryedo.....	5-8
		Artichokes ^b	April	15-25
		(Wheat ^c	September 15 to October 1.....	5
February and March ..	Oklahoma....	Rye	September	6-10
		Artichokes	April	15-25
	Kansas	Rye	September 1.....	5-10
		(Artichokes ^b	April	15-25

^a Rape will furnish fall pasture as indicated. If it is not pastured too close in the spring, it will branch out from the roots and stem in the fall. It may also be planted in August for fall pasture.

^b Artichokes are available when not frozen. They may be left in the ground until it thaws in the spring, when the hogs will finish harvesting them.

^c Wheat should not be pastured after April 1 if a crop of grain is desired.

SYSTEMS OF HOG FEEDING AND PASTURING.

Nearly every farmer who has succeeded with hogs has a feeding system of his own, yet there are some features common to all.

SYSTEM OF AN OKLAHOMA FARMER.

A good illustration of the successful handling of hogs on a small farm is that employed by a man in northern Oklahoma on an 80-acre farm. He has his whole farm fenced hog-tight and turns off annually from it an average of 100 head of hogs. All these are of his own raising and are grown and fitted for market with the crops raised on his farm, with the exception that a little corn is occasionally bought. He has 5 acres of alfalfa and each autumn sows 5 acres of wheat for late fall and winter pasture. In the spring he sows oats to supplement the wheat and alfalfa. The wheat is sown at the rate of $1\frac{1}{2}$ bushels to the acre, about September 1, and furnishes pasture in the fall, when alfalfa pasture is getting short, and for a part of the winter. The wheat will also furnish some pasture for the hogs in the spring. The oats tide over until the alfalfa is ready for pasturing. Thus, green feed is furnished for the greater part of the year. The rest of his 80 acres this farmer plants to corn. A part of this corn is fenced off and "hogged down" by the spring pigs in the fall. As fast as the hogs need it the fence is moved over, and

fresh corn is taken in. This pasturing is begun at the same time that corn is usually cut up green and fed to hogs, i. e., when it is in the roasting-ear stage. This plan of feeding is kept up until the remainder of the corn is all husked from the field. Then the hogs are turned in to clean up the waste corn in the field. Last summer cow-peas were drilled in the corn when it was cultivated the last time. These furnished much valuable feed in addition to the corn.

In April this man had 20 head of fall pigs averaging about 125 pounds. These shoats had had no feed except wheat and alfalfa pasture and the waste grain they gathered from the field, except a little corn that was thrown to them each day in the late winter and early spring. In April they were put on ground corn for thirty days. During this time each ate an average of one-fourth bushel daily. At the end of thirty days they averaged 225 pounds. This makes an average gain of $3\frac{1}{3}$ pounds per day, or a little more than 13 pounds of gain for each bushel of corn fed. The market price of corn was 50 cents a bushel. The hogs sold at \$5.50 per hundred, thus bringing $73\frac{1}{3}$ cents a bushel for the corn fed.

This farmer raises two lots of pigs a year, farrowed in March and September, turning off fall pigs in the spring and spring pigs in the fall, selling at 6 to 8 months old. From March 15 to November 1, 1906, he turned off \$720.50 worth of hogs and had 22 head in the fattening pens, all of his own raising and all grown and fattened on the products of his own farm.

EXPERIENCES OF FARMERS IN RAISING FALL PIGS.

Another farm in the same locality will serve as an illustration of what may be done with fall pigs in this section. Eighty head ran on the alfalfa and wheat fields of the farm during fall and winter. They gathered roughage and waste grain in the fields and were fed no grain until 6 months old. At this age they averaged 135 pounds. They were then fed some corn on alfalfa pasture, the amount gradually increasing till the pigs were on full feed. Corn was fed for two months, during which time the pigs made an average gain of 14 pounds for every bushel fed. They were sold at 8 months old, weighing 235 pounds each. The price of the corn was 45 cents a bushel. This makes the cost of the corn fed \$257.14, or \$3.21 for each hog. At the average price of hogs in this locality, $5\frac{1}{2}$ cents, the herd averaged \$12.92 $\frac{1}{2}$ per head. Deducting the price of corn fed leaves \$9.71 for each hog, to represent the value of the fall and winter pasture, the farmer's labor, profits, etc.

Another farmer ran a bunch of September pigs on alfalfa and wheat pastures until the following May, when they weighed 125 pounds. They received in addition one ear of corn each twice a day.

At this time the corn was increased gradually until each hog was getting 10 ears twice a day, which this farmer claims is the maximum feed for young hogs. They were fed thus for six weeks, making in this time a gain of about 100 pounds a head, and consuming 10 bushels of corn each at a cost of \$3.50 a head, or $3\frac{1}{2}$ cents a pound for each pound of gain on corn. Allowing 4 bushels more as the quantity probably fed up to the fattening period at two ears a day, makes the cost for corn for each hog \$4.90. To this adding \$1.10 a head for pasture and slop (the cost of the slop fed is not known) brings the cost of each hog to \$6.50 a head, or $2\frac{2}{3}$ cents a pound. This allowed a good margin of profit at the ruling price of pork.

ALFALFA HAY FOR BROOD SOWS.

To show the importance of alfalfa hay in a system of feeding, the practice of the farmers around North Platte, Nebr., and elsewhere may be mentioned. The alfalfa hay is ground up fine or else fed whole with corn in the proportion of about 5 pounds of alfalfa to 1 pound of corn. This is fed to the brood sows during the winter, and they come through in excellent condition on very cheap feed. In many sections alfalfa hay is worth about \$5 a ton on the farm. One ton of alfalfa and about 8 bushels of corn will keep three brood sows one hundred and thirty days, or nearly the whole winter. The hogs so kept farrow pigs that are remarkable for their vigor and size.

"HOGGING DOWN" CORN.

In these times of scarcity of labor and its high price many farmers are trying to reduce the labor on the farm. Some of the hog raisers have adopted the plan of harvesting the corn crop by turning the hogs into the cornfield and letting them gather it, or "hogging it down," as it is called.

A man in Ohio turned 122 spring pigs and older hogs (about equal numbers of each) into a 10-acre cornfield in September. The spring pigs averaged 82 pounds and the older hogs 156 pounds, and the total weight of all was 15,693 pounds. The corn would yield about 60 bushels an acre, and in it there were a good many pumpkins. The hogs had access also to a 5-acre clover field from which the seed had been removed. Water was hauled to them and they had the shade of the woods near by. In twenty-eight days the hogs had gained 6,522 pounds. At this time 57 head, averaging 245 pounds, were sold at \$5.15 per hundred. The remainder were not sold, but the farmer was offered \$5 per hundred for them. Counting the entire gain of 6,522 pounds at \$5 would make \$326.10, or \$32.61 per acre for the field. This paid 52 cents a bushel for the corn which on the

market was worth 40 cents. The whole herd made an average daily gain of 1.91 pounds per head.

A man in southern Kansas, who makes a practice of "hogging down" corn, uses a portable fence and fences off 5 to 10 acres at a time, taking in more as needed. He turns the hogs in the corn in August. On 12 acres of corn one year he fattened 50 head of hogs, the corn being estimated at about 600 bushels. Of the bunch 42 head were sold, averaging 240 pounds, netting \$600. Allowing 100 pounds gain for each hog on the corn thus fed, the corn brought 41½ cents a bushel, without the expense of gathering.

A farmer in Oklahoma has been "hogging down" corn for a number of years. About 500 head of hogs are turned off this farm every year. By gathering and feeding corn beside that which was gathered by hogs, it was found that a bushel of corn "hogged down" will make as much pork as the same quantity husked and fed, while the expense of harvesting is saved; besides saving the labor of feeding the corn to the hogs, the field is also cleaned up better than a husked field.

An Iowa farmer began "hogging down" corn several years ago, using 20 acres the first year. He watched carefully the feeding of the hogs on this field and concluded that no more corn was wasted than would have been left in the field by the average husker. Since that time he has "hogged down" all his corn, thus saving the expense of husking. This man says the cost of husking for one year will make the fence around the field hog-tight, if there is already a wire fence for cattle. Husking 40 acres of corn yielding 40 bushels per acre, at 4 cents per bushel—it cost nearer 5 cents last season (1907)—amounts to \$64. If the 40-acre field is square, this allows 20 cents a rod for the fence the first year. With a cattle fence already provided this will buy the wire to make it a good hog-tight fence.

Besides saving the expense of harvesting the corn, there are two other great objects to be attained by this method of harvesting corn: (1) The improvement of the land and (2) the health of the hogs. The farmer referred to says that in his first year's experience he snapped 20 acres of corn beside the field "hogged down." The next spring both fields were sown to small grain under the same conditions and with the same preparation. On the land where corn was "hogged down" the wheat made 5 and the oats 7 bushels more to the acre than did the other. The difference is just as noticeable in a succeeding corn crop. The husks, cobs, stalks, and leaves all remain on the land, and these, with the manure from the hogs, enrich the soil and increase its humus content.

The health of the hog is an important consideration. Hogs that have plenty of range and exercise are not nearly so susceptible to

disease as those confined in a small pen. A hog that goes out after his feed will be well grown and thrifty, accustomed to exposure, and not liable to be injured by a sudden change of weather.

It is difficult, however, to put a good finish on hogs while running in a large field or pasture. If they are allowed to run until three weeks or a month before sending to market, and are then shut up and given all the corn they want, with plenty of pure water, they will make very rapid gains. This man allows his pigs to run in the corn as soon as it is cultivated the last time, but does not let the older hogs into the field until the corn is in good condition to feed in the fall. He says he has also had good results from letting cattle into the corn first and following these with hogs.